U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: SURFACE MOVEMENT GUIDANCE AND CONTROL SYSTEM (SMGCS)	Date: (Draft 7/2/96)	AC No: 120-57A
	Initiated By: AFS-400	Change:

1. PURPOSE. This Advisory Circular (AC) describes the standards and provides guidance in the development of a Surface Movement Guidance and Control System (SMGCS) plan for U.S. airports where scheduled Air Carriers are authorized to conduct operations when the visibility is less than 1,200 feet runway visual range (RVR). A SMGCS plan facilitates the safe movement of aircraft and vehicles on the airport by establishing more rigorous control procedures and requiring enhanced visual aids.

2. APPLICABILITY. The guidance in this AC applies to all Title 14 of the Code of Federal Regulations (14 CFR) part 139 airports where air carriers are authorized to conduct takeoffs or landings below 1,200 feet RVR.

3. CANCELLATION. AC 120-57 dated 9/4/92 is canceled.

4. RELATED REGULATIONS (CFR) RESOURCES.

a. Reference Appendix 1 for a listing of Advisory Circulars (AC's) and FAA Orders relating to SMGCS.

b. Reference Appendix 2 for an example of a typical SMGCS plan.

c. Reference Appendix 3 for guidelines in developing a SMGCS plan for operations below 1,200 feet RVR down to and including 600 feet RVR.

d. Reference Appendix 4 for additional guidelines in developing a SMGCS plan for operations below 600 feet RVR.

e. Reference part 139, Certification and Operations: Land Airports Serving Certain Air Carriers.

5. DEFINITIONS. Definitions pertaining to SMGCS procedures are listed below and when available, the source document from which the definition was derived, such as the Code of Federal Regulations (CFR), Aeronautical Information Manual (AIM), or related Advisory Circulars (ACs).

a. Apron (Ramp). A defined area on an airport intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance. The apron area includes the following components: (reference AIM and AC 150/5340-1G)

(1) Aircraft Parking Positions. Intended for parking aircraft to enplane/deplane passengers, load or unload cargo.

(2) Aircraft Service Areas. On or adjacent to an aircraft parking position. Intended for use by personnel/equipment for servicing aircraft and staging of equipment to facilitate loading and unloading of aircraft.

(3) Taxilanes. Apron areas which provide taxiing aircraft access to and from parking positions.

(4) Vehicle Roadways Markings. Identified rights of way on the apron area designated for service and Aircraft Rescue and Fire Fighting (AARF) vehicles.

b. ARFF. Aircraft Rescue and Fire Fighting capability.

c. Clearance Bar. A clearance bar consists of three in-pavement steady-burning yellow lights. (reference AIM)

d. Controlling Region. Refers to the FAA geographic region in which an airport is located.

e. Gate Designator Markings. Pavement markings used to identify an aircraft parking position/gate(s).

f. Geographic Position Markings. Pavement markings used to identify the location of aircraft or vehicles during low visibility conditions. They are referred to as “spots” by air traffic control (ATC). (reference AC 150/5340-1G)

g. Judgmental Over-Steering. When the taxiway centerline does not provide an adequate turn radius, the pilot may intentionally over-steer the aircraft nose wheel to keep the aircraft's main gear within the defined edges of the taxiway.

h. Low Visibility Operations. The movement of aircraft or vehicles on the airport paved surfaces when visibility conditions are reported to be less than 1,200 feet RVR.

i. Movement Area. Refers to the runways, taxiways, and other areas of an airport which are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and aircraft parking areas. (reference part 139.3)

j. Non-movement Area. Refers to taxiways and apron areas that are not under ATC.

k. Runway Guard Lights--Elevated. Fixture consists of a pair of elevated flashing yellow lights installed on both sides of a taxiway, at the runway hold position marking. Their function is to confirm the presence of an active runway and assist in preventing runway incursions. (reference AIM)

l. Runway Guard Lights--In-pavement. Fixture consists of a row of in-pavement flashing yellow lights installed across the entire taxiway, at the runway hold position marking. Their function is to confirm the presence of an active runway and assist in preventing runway incursions. (reference AIM)

m. Runway Visual Range (RVR). An instrumentally derived value based upon standard calibrations that represents the horizontal distance a pilot will see down the runway from the approach end. (reference AC 97-1A)

(1) Touchdown RVR. The RVR visibility readout values obtained from RVR equipment serving the runway touchdown zone.

(2) Mid-RVR. The RVR visibility readout values obtained from RVR equipment located midfield of the runway.

(3) Rollout RVR. The RVR visibility readout values obtained from RVR equipment located nearest the rollout end of the runway.

n. Stop Bar. Stop bar lights consist of elevated and in-pavement red fixtures that are installed at the runway holding position or ILS critical area holding position marking. Stop bars may be controllable by ATC and will include a system of in-pavement green taxiway centerline/lead-on lights at locations where aircraft will enter or cross a runway.

o. Surface Movement Guidance and Control System (SMGCS). A SMGCS system consists of the provision of guidance to, and control or regulation of, all aircraft, ground vehicles and personnel on the movement area of an aerodrome. Guidance relates to facilities, information and advice necessary to enable the pilots of aircraft or the drivers of

ground vehicles to find their way on the aerodrome and to keep the aircraft or vehicles on the surfaces or within the areas intended for their use. Control or regulation means the measures necessary to prevent collisions and to ensure that the traffic flows smooth and freely. (reference ICAO SMGCS Manual Doc 9476-AN/927)

p. Surface Movement Surveillance System (SMSS). A system which provides positive identification and accurate positional information on all aircraft and vehicles.

q. Surface Painted Holding Position Sign. Pavement marking which is used to identify a specific runway. These markings are configured the same as the associated sign. (reference AC 150/5340-1G)

r. Surface Painted Direction Sign. Pavement markings that are configured the same as the associated sign and provided when it is not possible to provide taxiway direction signs at intersections. (reference AC 150/5340-1G)

s. Surface Painted Location Sign. Pavement markings that are configured the same as the associated sign, and are used to supplement the signs located along side the taxiway and assist the pilot in confirming the designation of the taxiway on which the aircraft is located. (reference AC 150/5340-1G)

t. Taxi Route. In this document, a specific sequence of lighted taxiways used by aircraft during low visibility operations.

u. Unserviceable. In this document, refers to equipment which is inoperative, obscured (i.e., by ice, snow, sand), degraded, not operating normally (e.g. abnormally low intensity), or not performing its intended function.

6. IMPLEMENTATION OF SMGCS.

a. SMGCS Working Group. The airport operator, in consultation with the users, should establish a SMGCS working group for all takeoff and landing operations below 1,200 feet RVR. The SMGCS working group should include representatives from:

(1) Airport staff involved with airfield operations, lighting, aircraft rescue and fire fighting (ARFF), security/traffic control, and any other appropriate personnel.

(2) FAA ATC (local and/or regional).

(3) FAA Airports District office (ADO) or Regional office.

(4) FAA Flight Standards (local and/or regional).

(5) FAA Airway Facilities Sector office.

(6) Appropriate scheduled airlines.

(7) Appropriate Air Transport Association representative.

(8) Air Line Pilots Association (ALPA) or other appropriate pilot groups.

(9) Appropriate cargo/package operators and military aviation tenants.

(10) Appropriate operators under 14 CFR part 91 and/or service corporations. (Includes general aviation and corporate operators.)

b. Airport Evaluation. Since no two airports nor aircraft capabilities are alike, the SMGCS working group should review the existing airport layout, facilities, IFR minima, and operational procedures at the airport, prior to the development of the airport SMGCS plan. Comparison of the existing and planned operating capability with the guidelines of this AC should determine what additional measures are necessary to achieve the desired low visibility operations. This review should include at least the following:

(1) Airport layout and surface traffic patterns. (Includes runways, taxiways, fillets, and taxilanes used for current low visibility operations and those needed to achieve new low visibility operations.)

(2) Air traffic procedures used for current low visibility operations, and changes or additional facilities needed to support new low visibility operations.

(3) Surface lighting, marking, and signs used for runways, taxiways, taxilanes and gate lead-in markings. (Identify additional needs in support of low visibility operations, i.e. stop bars, runway guard lights, clearance bars, taxiway centerline lighting, reflectors, geographic position markings, etc.) Additionally, review the capability to electronically monitor and inspect lighting systems.

(4) Equipment, procedures, and training to support aircraft rescue and fire-fighting (ARFF) services in low visibility operations.

(5) Ground support vehicle operations during low visibility conditions. (Review any restrictions, controls, or training needed, and whether airport operations or tenants will provide, if necessary, follow-me or towing services on the movement area.)

(6) Protection of ILS critical areas and obstacle free zones.

(7) Snow removal equipment routing and priorities during low visibility conditions.

(8) The adequacy of current airport charts.

(9) Advanced technologies for below 600 feet RVR operations (e.g., enhanced vision systems (EVS), head-up-display systems (HUD), forward looking infrared systems (FLIR), and global positioning system (GPS)).

c. SMGCS Operations Minimum Selection. Most airports authorized for Category II/III operations already have most of the basic airport signing, lighting and marking required under a SMGCS plan. The additional requirements contained in this AC are designed to enhance the safety of low visibility operations. These requirements represent both an initial capital cost and continuing maintenance and operations budget requirements. Prior to establishing the ultimate low visibility minimums for the SMGCS plan, the SMGCS working group should perform a detailed analysis to insure that the benefits from seeking lower takeoff or landing minimums justify the initial costs of the equipment and continuing maintenance costs. The analysis should consider at least the following:

(1) A compilation and evaluation of historic low visibility weather data for the airport. The data may be obtained from the National Oceanic and Atmospheric Administration (NOAA), Asheville, NC; the local National Weather Service (NWS); or other private industry sources. This data should reflect actual RVR values and be analyzed for time of day and number and frequency of affected aircraft operations.

(2) A determination of which users are capable of using the low visibility takeoff and landing procedures. This is available from the FAA published CAT II/III Status List. The list contains current air carriers, aircraft type, and airport authorizations. Refer to Appendix 5 for instructions on how to access this and other SMGCS information from the FAA on-line bulletin board system.

(3) Costs for both RVR ranges, less than 1,200 feet RVR down to and including 600 feet RVR, and less than 600 feet RVR. These costs may include:

(a) Taxiway edge lights
(b) Taxiway centerline lights
(c) Runway guard lights
(d) Stopbar lights
(e) Associated hardware and software
(f) Taxiway/ramp markings

(g) Airport Surface Detection Equipment (ASDE) III or equivalent
(h) Expanded communications facilities/ramp control
(i) Paving (taxiway fillets)
(j) Ground equipment/vehicles (follow-me, tow or ARFF vehicles)
(k) Charting
(l) Operation and Maintenance (O & M)
(m) Training
(n) Personnel
(o) Other advanced technologies

d. Airport SMGCS Plan. A detailed SMGCS plan should be developed for each airport to cover existing or planned low visibility operations. Appendix 2 contains a sample SMGCS plan. Appendix 3 and Appendix 4 contain guidance for developing a SMGCS Plan.

(1) Airports with takeoff and/or landing operations below 1,200 feet RVR should submit to the controlling FAA Flight Standards Division a completed SMGCS plan. The plan should include a timetable for budgeting and implementing the various components of the proposed plan. The airport operator should promptly initiate action to institute its SMGCS plan once FAA approval to proceed is received. Upon receipt of the plan, the FAA will advise the airport operator which actions included in the timetable, if any, should be delayed.

(2) The SMGCS plan should cover planned low visibility operations. Each low visibility operation and taxi route should be described in detail with its supporting facilities and equipment.

(3) The plan should clearly identify the responsibilities of those involved (e.g., airport operator, ATC, ARFF, air carriers, and ground vehicle operators). The plan should also clearly identify how and when these responsibilities will be carried out (e.g., the plan may identify different requirements for operations between 1,200 feet RVR and 600 feet RVR, and those operations below 600 feet RVR).

(4) All SMGCS plans should be submitted through the appropriate FAA Regional Flight Standards Division, to the Manager, Technical Programs Division, AFS-400 (FAA Headquarters) for approval.

(5) After initial approval by FAA Headquarters, revisions to SMGCS plans may be accomplished by the SMGCS working group when desired, and routed through the region Flight Standards Division for approval.

7. RESPONSIBILITIES.

a. Flight Standards - Headquarters. The Manager, Technical Programs Division, AFS-400 is the final approving authority for all SMGCS plans. AFS-400 will review the airport's SMGCS plan, low visibility taxi route chart, and on-site inspection evaluation before authorizing low visibility operations. Coordination will be effected with the Air Traffic Rules and Procedures Service and the Office of Airport Safety and Standards. When results of the AFS-400 review have been completed, written comments or approval will be returned to the region Flight Standards Division for relay to the airport operator. The determination may be approved, approved with conditions, or not approved pending accomplishment of recommendations and subsequent re-submission.

b. Flight Standards - Controlling Region. The FAA's controlling Flight Standards Division will have responsibility for:

(1) Participation in SMGCS Meetings. A representative of Flight Standards should participate in SMGCS working group meetings.

(2) Review of SMGCS Plans. Flight Standards is responsible for coordinating the review of draft SMGCS plans to determine conformance with the criteria contained in existing FAA orders, advisory circulars, and guidance in this AC. This should include coordination with the Airports and Air Traffic Divisions. The airport operator will be notified of any deficiencies or recommendations.

(3) Forwarding of SMGCS Plans. The SMGCS plan and taxi route chart will be forwarded to FAA Headquarters, Manager, Technical Programs Division, AFS-400 for review and approval. Subsequent revisions to SMGCS plans can be approved by regional personnel.

(4) On-Site Inspection. An on-site inspection should be accomplished for all SMGCS airports and can be completed as an ongoing process, a specific event, or associated with the airport certification inspection. The inspection should be accomplished by controlling FAA Flight Standards, Airports, and ATC personnel and other airport tenant officials. The on-site inspection should be accomplished at night to simulate restricted visibility conditions, and will be used to evaluate lighting, markings, procedures, etc. as denoted in the SMGCS plan. The evaluation should also include the review of appropriate communications between ATC and the airport operator on the initiation and termination of SMGCS procedures, and availability of the airport SMGCS chart. Evaluation of alternative procedures of inoperative components such as stop bar and taxiway centerline lighting systems, Surface Movement Radar, etc. should also be

reviewed if installed. Noted deficiencies and corrective recommendations will be provided to the airport operator and appropriate organizations. The on-site inspection(s) should be completed prior to beginning initial SMGCS operations.

> Note: For less than 600 feet RVR operations and if needed, AFS-400 will coordinate a Headquarters team to perform an on-site visit to inspect the airport SMGCS system and facilities.

(5) Adherence to SMGCS Plans. The controlling Flight Standards Division is responsible for monitoring the adherence to approved SMGCS plans under its purview, in coordination with the region Airports Division, part 139 certification inspector. Flight Standards, in consultation with the airport operator and/or appropriate organization(s), will be notified of any deficiencies or recommendations. Safety related deficiencies may require the temporary withdrawal of approval for specified low visibility operations.

c. Airports Division - Controlling Region. The FAA's controlling regional Airports Division will have responsibility for:

(1) Participation in SMGCS Meetings. A representative of Airports Division and/or ADO should participate in SMGCS working group meetings.

(2) Review of SMGCS Plans. Airports Division should review SMGCS plans in coordination with Flight Standards and Air Traffic.

(3) Advice and Guidance. Airports Division is responsible for providing advice and guidance to SMGCS working groups regarding such matters as the standards on lighting, marking, signs, and paving. They may also advise on the eligibility of projects for Airport Improvement Program (AIP) funding.

d. Air Traffic Division. The controlling FAA Air Traffic Division will be responsible for those sections of the SMGCS plan which are under its control and should correct deficiencies that are observed or brought to its attention.

(1) Participation in SMGCS Meetings. A local or regional Air Traffic representative should participate in SMGCS working group meetings. They should assure that designated low visibility routes and procedures will enhance the safe and expeditious flow of traffic on the movement area during low visibility conditions.

(2) Advice and Guidance. Air Traffic is responsible for providing advice and guidance to SMGCS working groups.

(3) Review of SMGCS Plans and Taxi Route Charts. Air Traffic Division is responsible to review submitted SMGCS plans and low visibility taxi route charts in coordination with Flight Standards and Airports Divisions. The chairman of the SMGCS working group will be notified of any deficiencies and recommendations. The low visibility taxi route charts will be coordinated with FAA Headquarters, Air Traffic Rules and Procedures Service, Terminal Procedures Branch, ATP-120, for suitability.

(4) Initiation and Termination of SMGCS Procedures. Air Traffic will be responsible to initiate and terminate each phase of SMGCS procedures in accordance with the SMGCS plan. (Initiation of SMGCS procedures will take some time. Therefore, the implementation and termination should be based on meteorological trends of increasing/decreasing RVR values and weather phenomena such as patchy fog and pilot reports.) ATC will notify airport operations of the pending initiation of SMGCS procedures. Airport operations should notify Air Traffic when all appropriate tenants have been contacted. ATC will subsequently notify airport operations of their termination of low visibility operations.

(5) Automatic Terminal Information Service (ATIS). The initiation of SMGCS procedures should be broadcast on the ATIS.

(6) **For operations below 1,200 feet RVR,** ATC will operate stop bar lights where installed.

(7) Geographic Positioning. ATC will control aircraft and ground vehicles on the movement area by monitoring their geographic positioning and spatial relationship. The SMGCS plan should outline ATC procedures to be employed in the event the surface movement surveillance system (SMSS) becomes inoperative during visibility's less than 600 feet RVR.

(8) Notifying and Assisting Aircraft Rescue and Fire Fighting (ARFF). During low visibility operations the role of ATC in notifying and assisting ARFF services increases in significance. Procedures, systems and/or techniques should be established and reviewed annually, in coordination with the airport operator, to ensure that aircraft requiring assistance can be located and ARFF services provided.

e. Airport Operator. The airport operator will be responsible for those sections of the SMGCS plan which are under its control and should correct deficiencies that are observed

or brought to its attention. The airport operator will designate from its staff the chairperson of the airport's SMGCS working group. The airport operator should:

(1) Call and chair meetings of the airport's SMGCS working group. This group should meet at least annually to review the SMGCS plan, procedures, and operations. They should also solicit attendance from appropriate personnel from the organizations listed in paragraph 6a.

(2) Coordinate actions necessary to analyze the cost benefit study in regard to desired minima; to reach a working group consensus on which desired minima is feasible and cost beneficial; and to achieve the installation and operation of facilities, equipment and/or procedures required to support low visibility operations.

(3) Coordinate the drafting, editing, submission, publication, distribution, and revision of the SMGCS plan.

(4) Assure that initial and recurrent training on SMGCS procedures is accomplished and documented for ARFF personnel, airport vehicle operators, and tenant vehicle operators.

(5) Notify other organizations having responsibilities under the SMGCS plan of deficiencies observed or brought to their attention which require their correction.

(6) If remote electronic monitoring capability is not available, ensure the timely inspection of airfield visual aids, such as lights, signs, and markings. Assure timely issuance and cancellation of appropriate NOTAMS regarding outages of airport facilities and equipment which support low visibility operations.

(7) Notify tenants of ATC's impending initiation or termination of SMGCS procedures.

(8) Advise ATC of airfield conditions or irregularities which may impact air traffic control operations.

(9) Coordinate with the SMGCS working group actions necessary in developing a low visibility chart.

(10) Make follow-me services available.

f. Tenant Organizations. Airport tenants will be responsible for adherence to the SMGCS plan and will correct such deficiencies that are observed or brought to their attention.

8. VISUAL AID REQUIREMENTS. During low visibility operations, adequate visual cues to pilots and vehicle operators are necessary in order to maintain their situational awareness and to ensure the continuation of safe, efficient ground operations. Visual aids should be installed in accordance with the standards set forth in the AC 150/5340 series (listed in Appendix 1).

a. Taxiway Lighting.

(1) **Movement Area**.

(a) **For operations below 1,200 feet RVR**, one of the following should be installed along each taxi route in the movement area:

1 Taxiway edge lights **or**;

2 Taxiway centerline lights supplemented with raised edge reflectors on curves and turns.

Note: Centerline lights are more effective than edge lights in low visibility operations; however, at airports where ice and snow could obscure centerline lights, it may be advantageous to install edge lights.

(b) **For operations below 1,200 feet RVR**, taxiway edge lights should be installed at intersections along the taxi route where an aircraft is expected to turn and the taxiway width or pavement fillet does not meet the design standards of AC 150/5300-13, Airport Design, current edition. (See Appendix 1)

(c) **For operations below 600 feet RVR**, taxiway centerline lights supplemented on curves and turns with edge lights should be installed along each taxi route in the movement area. The taxiway centerline lights should extend continuously from the runway centerline to the non-movement area. When the taxi route crosses or extends onto a runway, centerline lights should be installed.

Note: It is recommended that taxiway lights be turned off, to the maximum extent possible, on those taxiways or runway exits that are not part of a low visibility taxi route.

(2) **Non-movement Area**.

(a) **For operations below 1,200 feet RVR,** down to and including 600 feet RVR, neither lighting nor reflectors are required.

Note: The installation of centerline lights, or secondarily, centerline reflectors, is recommended along taxiway and taxilane centerlines to provide improved guidance.

(b) **For operations below 600 feet RVR:**

1 Taxiway centerline lights should be installed **or**,

2 The SMGCS plan must contain provisions for taxiing assistance for pilots in the form of a "follow me" vehicle, towing via a tug, or ground marshalling.

b. Lights at Access to Active Runways.

(1) **For operations below 1,200 feet RVR:**

(a) Except as provided in the following paragraph, all taxiways that provide access to an active runway (regardless of whether they are part of the low visibility taxi route) should have runway guard lights installed at the runway holding position on the taxiway. If both a runway holding position **and** ILS critical area holding position marking are present, runway guard lights should be installed at the runway holding position only. (See Appendix 5)

(b) In certain instances, the SMGCS working group may determine that at certain taxiway/runway intersections runway guard lights may not be necessary. In making such a evaluation, the working group should consider if the intersection and runway environment is safe-guarded from the inadvertent entry of aircraft and vehicles through other means (e.g., traffic volume and routings, airport configuration).

Note: The new installation or upgrading of elevated runway guard lights may not be required if in-pavement runway guard lights or stop bar lights are installed at the same location.

(2) **For operations below 600 feet RVR:**

(a) In addition to the criteria specified in paragraph 8b (1), all illuminated (i.e., centerline and/or edge lights turned on) taxiways that provide access to an active runway (regardless of whether or not they are part of the taxi route) should have stop bar lights installed at the runway holding position. If both a runway holding position and an ILS critical area holding position marking are present, the stop bar should be installed at only the ILS critical area holding position. Stop bars on taxiways which are used to enter

or cross an active runway should be capable of being operated individually. Such stop bars are termed "controlled stop bars." The remaining "uncontrolled" stop bars may operated by a single switch. Stop bar lights are used to positively control access to an active runway. At the approach end of a runway, in-pavement green lead-on lights will illuminate to provide a secondary visual confirmation of clearance onto the runway by ATC personnel.

(b) All non-illuminated taxiways (i.e., centerline and edge lights turned off) will be considered not available for taxiway or runway access, and do not need stop bars installed. However, the SMGCS working group should evaluate the need for any additional "uncontrolled" stop bars.

c. Runway Guard Light Selection. There are two configurations of runway guard lights. The following criteria should be used to determine which configuration should be installed at a specific runway holding position.

(1) Elevated runway guard lights should be installed at the runway holding position if the taxiway does not have taxiway centerline lights installed **and** is 150 feet wide or less. However, if the taxiway has a stop bar installed at the runway holding position, elevated runway guard lights should be co-located with the stop bar, regardless of taxiway width or the presence of taxiway centerline lights.

(2) In-pavement runway guard lights should be installed at the runway holding position if the taxiway has centerline lights installed, or the taxiway is greater than 150 feet wide, or a stop bar is installed at the ILS critical area holding position.

(3) In-pavement combination stop bar/runway guard light fixtures (dual red/yellow lens) may be installed at the discretion of the airport operator. The yellow in-pavement lights may not be turned on when the stop bar is in operation. If the stop bar is located at an ILS critical area holding position, dual red/yellow fixtures should not be selected. (This would result in the installation of two sets of runway guard lights at different locations which serve the same intersection.)

> Note: At airports where ice and snow could obscure in-pavement runway guard lights, it may be advantageous to also install elevated runway guard lights.

d. Clearance Bars/Holding Position Markings. Hold points along taxi routes should be appropriately denoted by the following:

(1) **For operations below 1,200 feet RVR,** taxiway holding position markings should be painted to denote hold points.

(2) **For operations below 600 feet RVR,** clearance bar lights should be installed at hold points, in addition to the taxiway holding position marking and geographic position marking.

e. Taxi Guidance Signing and Marking.

(1) **For operations below 1,200 feet RVR,** taxi guidance signs should be installed at taxiway intersections. Surface painted signs should be located on the pavement where they will enhance the operation as determined by the SMGCS working group, or where it is not feasible to install guidance signs.

(a) Paint markings that are bright and provide good contrast with the pavement are a significant low visibility guidance aid. These markings along low visibility taxi routes should receive special attention and be repainted when the conspicuity is degraded through wear and tear. Taxiway centerline markings, outlined with black borders, should be painted on light-colored pavements.

(b) The use of reflective or glass beaded paint should be used for geographic position markings. Glass beads should not be added to black paint.

(2) **For operations below 600 feet RVR**, geographic position "spot" markings identifying hold points, and co-located with a lighted clearance bar light, should be painted on the taxiway pavement. A geographic position marking located without a taxiway clearance bar light can also be used for positioning information or where location verification or additional guidance is expected to be needed. These markings will be at locations in the movement area where they enhance low visibility operations as determined by the SMGCS working group.

f. Monitoring and Visual Inspection of Lighting Aids. Controlled stop bars should be electronically monitored with a status indication provided in the ATC tower. It is recommended that all other lighting systems which support low visibility operations be electronically monitored.

(1) **For operations below 1,200 feet RVR:**

(a) An initial visual inspection of stop bar lights, runway guard lights, clearance bar lights, taxiway centerline lights, and taxiway edge lights installed on the low visibility routes or taxiways that intersect the low visibility runway(s) should be conducted by the airport operator prior to the implementation of SMGCS procedures.

This visual inspection is conducted to ensure that the lighting systems are "serviceable" as described in paragraph 8g, and that the lighting system status indicated on any associated electronic monitoring systems reflect the actual operating condition of the lights. All controlled stop bars should be checked for proper function (i.e., operation of sensors, lead-on lights, etc.). Taxiway centerline lights which lie beyond all uncontrolled stop bars are not part of a standard stop bar system and therefore, need not be visually inspected.

(b) A periodic visual inspection need not be conducted for lighting systems described in 8f(1)(a) which are electronically monitored except when meteorological conditions may render them unserviceable (e.g., snow, blowing snow, sand, etc.). Those lighting systems which are not electronically monitored should be periodically inspected every 2 to 4 hours. The interval is normally based on taxiway complexity/configuration, number of low visibility routes, number of taxiways that provide access to active runways, etc.

(2) **For operations below 600 feet RVR:**

(a) With the following exception, a visual inspection of stop bar lights, runway guard lights, clearance bar lights, taxiway centerline lights and taxiway edge lights installed on the low visibility routes or taxiways that intersect the low visibility runway(s) should be conducted by the airport operator prior to the commencement of operations below 600 feet RVR. Exception: Unless meteorological conditions may render the lights unserviceable (e.g., snow blowing snow, sand, etc.), the status of any of the aforementioned lighting systems which are electronically monitored may be determined from the lighting status indication on the monitor, provided that the monitor is capable of remotely detecting the unserviceability conditions in paragraph 8g. An inspection conducted within 2 hours prior to commencement of operations below 600 feet RVR would be acceptable for this inspection. This visual inspection is conducted to ensure that the lighting systems are "serviceable" as described in paragraph 8g. Because controlled stop bars are checked for proper function at the initial visual inspection and because of continuous use by aircraft, re-inspection of stop bars for functionality need not be performed. Taxiway centerline lights which lie beyond uncontrolled stop bars need not be visually inspected.

(b) The serviceability of lighting systems described in paragraph 8f(2)(a), except taxiway edge lights, which are electronically monitored with a system capable of remotely detecting the unserviceability conditions in paragraph 8g, should be determined every 2 hours from the lighting status indication on the monitor. Lighting systems which are not electronically monitored with a system of the same capability should be periodically inspected every 2 hours to ensure that the lighting systems remain "serviceable." The periodic inspection of controlled stop bars need not include a check

for proper function. Taxiway centerline lights which lie beyond all uncontrolled stop bars need not be visually inspected.

g. Maintenance Criteria for Lighting Aids. Taxiway edge lights, taxiway centerline lights, clearance bar lights, runway guard lights and stop bar lights supporting low visibility operations that are not electronically monitored should be included in a system of preventive maintenance that has the following objectives:

(1) Taxiway edge lights, taxiway edge reflectors and taxiway centerline lights along the low visibility taxi route -- no two adjacent lights or reflectors unserviceable.

(2) Stop bar lights or in-pavement runway guard lights -- no more than three lights per location unserviceable nor two adjacent lights unserviceable.

(3) Elevated runway guard lights -- no more than one light in a fixture unserviceable.

(4) Clearance bar lights -- no more than one light unserviceable.

(5) When any of the lighting aids do not meet the maintenance objectives above:

(a) Traffic should be rerouted to areas where the visual aids are operating normally or;

(b) Alternative procedures should be implemented to accommodate the operations or;

(c) Low visibility operations should be terminated until the lighting aids are returned to normal service.

(6) Lighting aids along the low visibility taxi route(s) that are inoperative should be repaired promptly with minimal disruption of service. If warranted, appropriate NOTAMS should be issued or canceled expeditiously.

h. Maintenance Criteria for Lighted Signs.

(1) Mandatory instruction signs, at entrances to the active low visibility runway(s), and location and direction signs, along low visibility taxi routes where aircraft will be required to hold or turn, should be inspected prior to implementation of SMGCS procedures, and every 2 to 4 hours thereafter while the SMGCS plan is in effect.

(2) When any required sign is not illuminated, unserviceable or missing, it should be repaired promptly with minimal disruption of service. If warranted, appropriate NOTAMS should be issued or canceled expeditiously, and:

(a) Traffic should be rerouted to areas where the visual aids are operating normally or;

(b) Alternative procedures should be implemented to accommodate the operations or;

(c) Low visibility operations should be terminated until the sign(s) are returned to normal service.

9. SURFACE MOVEMENT SURVEILLANCE SYSTEMS (SMSS).

a. **For operations below 1,200 feet RVR**, a surface movement radar (SMR), such as airport surface detection equipment (ASDE-3 equivalent), or alternative technologies that allow ATC to establish the geographic position of all aircraft and vehicles may be used.

b. **For operations below 600 feet RVR**, an SMR should be installed and operational. In the event that the SMR becomes inoperative during operations below 600 feet RVR, operations may continue while utilizing approved geographic positioning procedures until operations below 600 feet RVR are terminated. The SMR must be operational before resuming operations below 600 feet RVR.

10. AIRPORT FACILITIES AND SERVICES.

a. Aircraft Rescue and Fire Fighting (ARFF). During reduced visibility conditions, the role of ATC in notifying and assisting ARFF services increases in significance. Procedures, systems and/or techniques should be established and reviewed annually, in coordination with the airport operator, to ensure that aircraft requiring assistance can be located and ARFF services provided. **For operations below 600 feet RVR,** the pre-positioning of ARFF equipment (so as not to create a new obstacle), installation of forward looking infrared radar (FLIR) and global positioning system (GPS), or other approved alternative technology should be considered.

b. Taxiway Configuration. The SMGCS working group should examine the airport for adequacy of fillets and landing gear and/or wingtip clearances along taxiways used in low visibility conditions.

(1) **For operations below 1,200 feet RVR,** it is recommended that inadequate taxiway fillets be upgraded to meet current standards. Those locations that are not upgraded should be depicted on appropriate SMGCS low visibility taxi route charts. The notation may be in the form of a symbol identifying specific turning points or a general note such as "judgmental oversteering required along the taxi route."

(2) **For operations below 600 feet RVR,** inadequate taxiway fillets and clearances at turning points or other locations along taxi routes used for operations below 600 feet RVR should be upgraded to meet the current standard.

c. SMGCS Low Visibility Procedures. SMGCS procedures should be developed for each SMGCS airport authorized for low visibility operations. The procedures should include a method of notifying key personnel of participating organizations that SMGCS procedures have been initiated or terminated by ATC. Copies of the approved SMGCS plan and any revisions should be provided to all parties involved.

(1) All vehicle operators should receive SMGCS training in areas such as airport lights, signs, and markings procedures to follow if lost in the aircraft movement area, and if applicable, radio telephone procedures, including lost-communication procedures. The airport operator should review driver training programs to ensure that low visibility procedures are included and the training is documented. Vehicle operators supporting SMGCS operations should have a low visibility taxi route chart or equivalent available.

(2) Procedures for evaluating special situations such as construction activities, snow removal, and deicing procedures should be included in the SMGCS plan to determine any limitations that should be imposed on those vehicle activities when the SMGCS plan is implemented.

(3) **For operations below 1,200 feet RVR,** describe the method of limiting vehicle access to aircraft movement areas. Vehicular traffic in the movement areas should be restricted to the essential minimum to support low visibility operations. The SMGCS working group should review vehicle control and, if necessary, identify additional marking, lighting, restrictions, or other measures necessary to control vehicles in non-movement areas.

(4) **For operations below 600 feet RVR,** the SMGCS working group should ensure positive control of vehicles in situations where active roadways cross designated taxi routes in movement areas. This may include such methods as barriers, gates, signs, markings, traffic lights, and "road guards".

d. Apron Traffic Management. **For operations below 600 feet RVR,** the SMGCS plan should include an apron traffic management plan for all non-movement apron areas used by aircraft or vehicles. The apron traffic management plan should indicate the party

or parties who will coordinate the traffic movement in the apron area. The apron management entity(s) must limit access to the apron area to ensure the safe movement of all aircraft and vehicles operating within the area. Roadways which cross taxilanes must be kept clear by positive control methods, such as radio communications, when aircraft are using the apron area.

e. Taxiing Assistance in Non-Movement Areas. **For operations below 600 feet RVR**, where centerline lights are not installed, the SMGCS plan must contain provisions for taxiing assistance. Taxiing assistance may include such measures as follow-me vehicles or towing via a tug. The assistance should be provided by a method agreed upon by the SMGCS working group. Ground marshalling may be used to assist aircraft from the intersection of the taxilane centerline and the gate lead-in line.

11. AIRPORT CONDITION REPORTING. The loss of minima for low visibility landings or takeoffs can adversely affect aircraft operations, overall safety, and capacity. There are a number of critical components such as stop bar lights, centerline lights, etc. which, if become inoperative, may have an immediate impact on availability of takeoff or landing operations. This especially affects operations below 600 feet RVR. It is time-critical that pilots and dispatchers be notified quickly of these outages and their effects on operations. This will enable timely and appropriate decisions to be made.

a. Due to its importance, such adverse impacts on operations should be quickly disseminated by the airport operator via means available such as land line communications to local station dispatchers, and on ATIS in order to alert pilots of aircraft inbound to the airport.

b. The timely notification of inoperative components should be thoroughly covered in the SMGCS plan and with interested parties such as ATC, the airport operator, and local tenants.

c. Inoperative components affecting low visibility operations may be reported through the NOTAM system and/or the FAA Traffic Management System.

12. FLIGHT OPERATIONS. The SMGCS plan should identify any aspects of the following list of items that are specific or unique to the airport, relative to low visibility operations. Aircraft operators should address these items in appropriate training programs for **all** flight crew and ground support personnel who may be involved in aircraft or vehicle operations on the movement or non-movement areas of the airport. Such training should also be documented. Training items include but are not limited to:

a. Apron (ramp) operations

b. ILS critical areas, runway safety areas, and obstacle free zones

c. Stop bar lights

d. Runway guard lights

e. Taxiway centerline lights, including ILS critical area alternating green and yellow lights from runway centerline

f. Clearance bar lights

g. Runway lead-on and lead-off lights

h. Geographic position markings

i. Taxiway and runway hold position markings

j. Movement/non-movement boundary marking

k. Other pavement markings such as surface painted signs

l. Use of low visibility taxi route(s) chart(s)

m. Taxi procedures at turns requiring judgmental oversteering

13. AIRPORT LOW VISIBILITY TAXI ROUTE(S) CHART.

a. A low visibility taxi route(s) chart(s) must be provided for use by flight crew, ATC personnel, ARFF personnel, ground support vehicle operators and ground marshalling crews, if appropriate. The airport low visibility taxi route chart should be limited to one page, if possible, and is generated by the SMGCS working group in coordination with region Air Traffic Control, Flight Standards, and Airports divisions. The taxi route chart is coordinated with the Technical Programs Division, AFS-400, and approved by the Terminal Procedures Branch, ATP-120.

b. The chart(s) should provide at least the following information:

(1) Designated low visibility taxi route(s) for operations below 1,200 feet RVR down to and including 600 feet RVR,

(2) Designated low visibility taxi route(s) for operations below 600 feet RVR, if applicable,

(3) A legend depicting appropriate symbology and terminology,

(4) Location of runways, taxiways, aprons, and concourses,

(5) Location of runway and taxiway centerline lights, including lead-on and lead-off lights,

(6) Location of stop bar lights,

(7) Location of geographic position markings,

(8) Location of taxiway hold points,

(9) Location of clearance bar lights,

(10) Location of movement area boundaries,

(11) Location of inadequate fillets on taxiway turns and the need for judgmental oversteering by pilots,

(12) Location of de-icing pads,

(13) Location of ARFF stations, and

(14) Unique airport characteristics and/or procedures.

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